PATENT ABSTRACTS OF JAPAN

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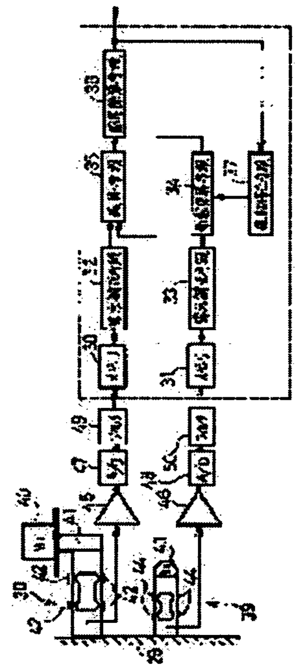
(54) APPARATUS FOR MASS MEASUREMENT AND APPARATUS FOR WEIGHT MEASUREMENT



(57)Abstract:
PURPOSE: To enhance weighing accuracy and to widen weighing range without lowering weighing accuracy.
CONSTITUTION: A weighing device comprises a load cell 38, mounted on an oscillating part 29, to generate a no.1 electric signal against an object 40 to be weighed, dummy load cell 39, mounted on the part 29, to generate a no.2 electric signal against a weight 43, coefficient multiplication means 34 to generate a multiplication signal of a coefficient and the no.2 electric signal, and subtraction means 35 to generate a subtraction signal of the no.1 electric signal and multiplication signal. The device is also provided with a sensitivity division means 36 to generate a mass signal of the object 40 on the basis of the subtraction signal, and coefficient correction means 37 to calculate the no.1 oscillating mass that determines the natural angular oscillation of the load cell 38 that oscillates under the object 40, on the basis of the mass signal generated by the sensitivity division means 36, to calculate a ratio of the no.2 oscillation mass to the no. I oscillation mass that determines the natural angular oscillation of the load cell 39 that oscillates under the weight 43, and to correct a coefficient to the coefficient calculated on the basis of the ratio.

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CLAIMS

[Claim(s)]
[Claim 1] A load conversion means for measuring to be established on the body to rock and to generate the 1st electrical signal corresponding to this weight in response to the weight of a measured object, A load conversion means for amendment by which it is prepared in the condition of receiving the same rocking as this load conversion means for measuring at the above-mentioned body, and weight generates the 2nd electrical signal corresponding to this weight in response to the weight of the known goods for amendment, A multiplier multiplication means to carry out the multiplication of the predetermined multiplier to the 2nd electrical signal of the above, and to generate a multiplication signal, In the mass metering installation which has a subtraction means to subtract the above-mentioned multiplication signal from the 1st electrical signal of the above, and to generate a subtraction signal, and an output means to compute the mass of the above-mentioned measured object based on the above-mentioned subtraction signal, and to generate a mass signal The 1st rocking mass which determines the proper angular frequency of an above-mentioned load conversion means for measuring to rock where the weight of the above-mentioned measured object is received is computed based on the mass signal of the above-mentioned measured object which the above-mentioned output means generated. Compute the ratio of the rocking mass of the above 1st to the 2nd known rocking mass which determines the proper angular frequency of an above-mentioned load conversion means for amendment to rock where the weight of the above-mentioned goods for amendment is received, and a multiplier is computed based on this ratio. The mass metering installation characterized by establishing a multiplier correction means by which the above-mentioned multiplier multiplication means corrects the above-mentioned predetermined multiplier which carries out multiplication to the this computed multiplier.
[Claim 2] A load conversion means for measuring to be established on the body to rock and to generate the 1st electrical signal corresponding to this weight in response to the weight of a measured object, A load conversion means for amendment by which it is prepared in the condition of receiving the same rocking as this load conversion means for measuring at the above-mentioned body, and weight generates the 2nd electrical signal corresponding to this weight in response to the weight of the known goods for amendment, A multiplier multiplication means to carry out the multiplication of the predetermined multiplier to the 2nd electrical signal of the above, and to generate a multiplication signal, In the mass metering installation which has a subtraction means to subtract the above-mentioned multiplication signal from the 1st electrical signal of the above, and to generate a subtraction signal, and an output means to compute the mass of the above-mentioned measured object based on the above-mentioned subtraction signal, and to generate a mass signal Proper angular frequency 1/2 of an above-mentioned load conversion means for measuring to rock where the weight of the above-mentioned measured object is received (k1 / m1) 1st rocking mass m1 It computes based on the mass signal of the above-mentioned measured object which the above-mentioned output means generated. Proper angular frequency 1/2 of an above-mentioned load conversion means for amendment to rock where the weight of the above-mentioned goods for amendment is received (k2 / m2) 2nd known rocking mass m2 Rocking mass m1 of the receiving above 1st Compute a

ratio and a multiplier is computed based on this ratio. The mass metering installation characterized by establishing a multiplier correction means by which the above-mentioned multiplier multiplication means corrects the above-mentioned predetermined multiplier which carries out multiplication to the this computed multiplier.

[Claim 3] A load conversion means for measuring to be established on the body to rock and to generate the 1st electrical signal corresponding to this weight in response to the weight of a measured object, A load conversion means for amendment by which it is prepared in the condition of receiving the same rocking as this load conversion means for measuring at the above-mentioned body, and weight generates the 2nd electrical signal corresponding to this weight in response to the weight of the known goods for amendment, A multiplier multiplication means to carry out the multiplication of the predetermined multiplier to the 2nd electrical signal of the above, and to generate a multiplication signal, In the batching-by-weight equipment which has a subtraction means to subtract the above-mentioned multiplication signal from the 1st electrical signal of the above, and to generate a subtraction signal, and an output means to compute the weight of the above-mentioned measured object based on the above-mentioned subtraction signal, and to generate a weight signal The 1st rocking mass which determines the proper angular frequency of an above-mentioned load conversion means for measuring to rock where the weight of the above-mentioned measured object is received is computed based on the weight signal of the above-mentioned measured object which the above-mentioned output means generated. Compute the ratio of the rocking mass of the above 1st to the 2nd known rocking mass which determines the proper angular frequency of an above-mentioned load conversion means for amendment to rock where the weight of the above-mentioned goods for amendment is received, and a multiplier is computed based on this ratio. Batching-by-weight equipment characterized by establishing a multiplier correction means by which the above-mentioned multiplier multiplication means corrects the above-mentioned predetermined multiplier which carries out multiplication to the this computed multiplier.

[Claim 4] A load conversion means for measuring to be established on the body to rock and to generate the 1st electrical signal corresponding to this weight in response to the weight of a measured object, A load conversion means for amendment to be formed in the condition of receiving the same rocking as this load conversion means for measuring at the above-mentioned body, and to generate the 2nd electrical signal corresponding to this weight in response to a self-weight at least, A multiplier multiplication means to carry out the multiplication of the predetermined multiplier to the 2nd electrical signal of the above, and to generate a multiplication signal, In the mass metering installation which has a subtraction means to subtract the above-mentioned multiplication signal from the 1st electrical signal of the above, and to generate a subtraction signal, and an output means to compute the mass of the above-mentioned measured object based on the above-mentioned subtraction signal, and to generate a mass signal The 1st rocking mass which determines the proper angular frequency of an above-mentioned load conversion means for measuring to rock where the weight of the above-mentioned measured object is received is computed based on the mass signal of the above-mentioned measured object which the above-mentioned output means generated. Compute the ratio of the rocking mass of the above 1st to the 2nd known rocking mass which determines the proper angular frequency of an above-mentioned load conversion means for amendment to rock, and a multiplier is computed based on this ratio. The mass metering installation characterized by establishing a multiplier correction means by which the above-mentioned multiplier multiplication means corrects the above-mentioned predetermined multiplier which carries out multiplication to the this computed multiplier.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] Especially this invention is installed on the body to rock, and relates to the batching-by-weight equipment which measures the mass metering installation and weight which measure the mass which removed the batching error by rocking from a body.
[0002]
[Description of the Prior Art] The conventional thing of the above-mentioned batching-by-weight equipment is indicated by JP,3-233327,A. As shown in drawing 4 , when a measured object is put on the installation base 3 according to the equipment, the load cell 1 for measuring is the weight W1 of the installation base 3 and a measured object. Distortion proportional to sum total weight is produced, and the analog electrical signal which is in agreement with weight is outputted. This analog electrical signal is outputted as a digital signal removed by the analog-digital converter 12 and the digital filter 14 in the high frequency noise, after being amplified by the amplifier 10.
[0003] On the other hand, the load cell 5 for dummies outputs the analog electrical signal which is in agreement with this weight in response to distortion equivalent to the weight W2 of the weight 6 attached in the edge. It is outputted as a digital signal removed by the analog-digital converter 13 and the digital filter 15 in the high frequency noise after being amplified by the amplifier 11, and this analog electrical signal is the weight W2 of weight 6 by the zero-point amendment means 19. Each other is offset by digital processing.
[0004] Under the present circumstances, if the vibration (or rocking) from the outside acts on batching-by-weight equipment, the load cell 1 for measuring is the tare weight WA which is the sum total weight of the installation base 3 and a load cell 1. Weight W1 of a measured object The signal containing the alternating current component of the period which was in agreement with the external period of vibration in it being also at the level width of face proportional to sum total weight (W1+WA) is outputted. Moreover, the load cell 5 for dummies is the tare weight WB which is the weight of a load cell 5. Weight W2 of weight 6 The signal containing the alternating current component of the period which was in agreement with the external period of vibration in it being also at the level width of face proportional to sum total weight (W2+WB) is outputted. The sum total weight (W2+WB) of weight 6 grade is offset by digital processing with the zero-point amendment means 19, only an oscillating component is extracted and the electrical signal which this load cell 5 for dummies outputs is outputted.
[0005] The multiplier multiplication means 20 carries out the multiplication of the multiplier K [=K1 and K2=(E1 / E2) - (W1+WA/W2+WB)] to data from the zero-point amendment means 19, and outputs it to them. However, E1 The sensitivity (output per unit weight) of the load cell 1 for measuring, and E2 It is the sensitivity (output per unit weight) of the load cell 5 for dummies. The amplitude of the oscillating component from the load cell 5 for dummies which originates in the difference of the total weight (W2+WB) concerning the load cell 5 for dummies and the total weight (W1+WA) concerning the load cell 1 for measuring by this will be amended.
[0006] The subtraction means 21 receives the data containing the oscillating component from a digital filter 14, and the data of the oscillating component from the multiplier multiplication means

20, subtracts these two [illegible]gital one, and outputs difference. By [illegible] the measuring data containing an oscillating component will be offset with the data from the multiplier multiplication means 20 only in the oscillating component, and will be changed into the data which were in agreement with the weight of a measured object.

[0007]

[Problem(s) to be Solved by the Invention] Although the multiplication of multiplication multiplier K=K1 and K2 =(E1 / E2) - (W1+WA/W2+WB) is carried out to data from the zero-point amendment means 19 with the above-mentioned conventional batching-by-weight equipment, for computing this multiplier K, it is the weight W1 of a measured object. It needs. However, this weight W1 Since it is strange weight, with the above-mentioned conventional equipment, it is the weight W1 of a measured object. It is the representation weight (abbreviation core weight) WD of a measured object to instead of. The multiplication multiplier K is computed by setting up. However, weight W1 of a measured object It is the above-mentioned representation weight WD by being usually different for every goods. Since it is not usually completely in agreement, it is the weight W1 of a measured object. Representation weight WD There is a problem that a batching error arises according to a difference.

[0008] therefore -- the above-mentioned conventional batching-by-weight equipment -- weight W1 of measured goods Representation weight WD from -- since it is alike, and it follows and a batching error becomes large, when it is going to make a batching error small, there is a problem which separates that width of face of the measuring range cannot be taken widely.

[0009] This invention aims at offering the mass metering installation and batching-by-weight equipment which can expand the width of face of the measuring range conventionally, without reducing measuring precision while it raises measuring precision conventionally.

[0010]

[Means for Solving the Problem] A load conversion means for measuring for the mass metering installation of the 1st invention to be formed on the body to rock, and to generate the 1st electrical signal corresponding to this weight in response to the weight of a measured object, A load conversion means for amendment by which it is prepared in the condition of receiving the same rocking as this load conversion means for measuring at the above-mentioned body, and weight generates the 2nd electrical signal corresponding to this weight in response to the weight of the known goods for amendment, A multiplier multiplication means to carry out the multiplication of the predetermined multiplier to the 2nd electrical signal of the above, and to generate a multiplication signal, In the mass metering installation which has a subtraction means to subtract the above-mentioned multiplication signal from the 1st electrical signal of the above, and to generate a subtraction signal, and an output means to compute the mass of the above-mentioned measured object based on the above-mentioned subtraction signal, and to generate a mass signal The 1st rocking mass which determines the proper angular frequency of an above-mentioned load conversion means for measuring to rock where the weight of the above-mentioned measured object is received is computed based on the mass signal of the above-mentioned measured object which the above-mentioned output means generated. Compute the ratio of the rocking mass of the above 1st to the 2nd known rocking mass which determines the proper angular frequency of an above-mentioned load conversion means for amendment to rock where the weight of the above-mentioned goods for amendment is received, and a multiplier is computed based on this ratio. The above-mentioned multiplier multiplication means is characterized by establishing a multiplier correction means to correct the above-mentioned predetermined multiplier which carries out multiplication to the this computed multiplier.

[0011] The mass metering installation of the 2nd invention is set to the 1st invention. A multiplier correction means Proper angular frequency 1/2 of an above-mentioned load conversion means for measuring to rock where the weight of the above-mentioned measured object is received (k1 / m1) 1st rocking mass m1 It computes based on the mass signal of the above-mentioned measured object which the above-mentioned output means generated. Proper angular frequency 1/2 of an above-mentioned load conversion means for amendment to rock where the weight of the above-mentioned goods for amendment is received (k2 / m2) 2nd known rocking mass m2 Rocking mass m1 of the receiving above 1st Compute a ratio and a multiplier is

computed based on this ratio. The above-mentioned multiplier multiplication means corrects the above-mentioned predetermined multiplier which carries out multiplication to the this computed multiplier.

[0012] A load conversion means for measuring for the batching-by-weight equipment of the 3rd invention to be formed on the body to rock, and to generate the 1st electrical signal corresponding to this weight in response to the weight of a measured object, A load conversion means for amendment by which it is prepared in the condition of receiving the same rocking as this load conversion means for measuring at the above-mentioned body, and weight generates the 2nd electrical signal corresponding to this weight in response to the weight of the known goods for amendment, A multiplier multiplication means to carry out the multiplication of the predetermined multiplier to the 2nd electrical signal of the above, and to generate a multiplication signal, In the batching-by-weight equipment which has a subtraction means to subtract the above-mentioned multiplication signal from the 1st electrical signal of the above, and to generate a subtraction signal, and an output means to compute the weight of the above-mentioned measured object based on the above-mentioned subtraction signal, and to generate a weight signal The 1st rocking mass which determines the proper angular frequency of an above-mentioned load conversion means for measuring to rock where the weight of the above-mentioned measured object is received is computed based on the weight signal of the above-mentioned measured object which the above-mentioned output means generated. Compute the ratio of the rocking mass of the above 1st to the 2nd known rocking mass which determines the proper angular frequency of an above-mentioned load conversion means for amendment to rock where the weight of the above-mentioned goods for amendment is received, and a multiplier is computed based on this ratio. The above-mentioned multiplier multiplication means is characterized by establishing a multiplier correction means to correct the above-mentioned predetermined multiplier which carries out multiplication to the this computed multiplier.

[0013] A load conversion means for measuring for the mass metering installation of the 4th invention to be formed on the body to rock, and to generate the 1st electrical signal corresponding to this weight in response to the weight of a measured object, A load conversion means for amendment to be formed in the condition of receiving the same rocking as this load conversion means for measuring at the above-mentioned body, and to generate the 2nd electrical signal corresponding to this weight in response to a self-weight at least, A multiplier multiplication means to carry out the multiplication of the predetermined multiplier to the 2nd electrical signal of the above, and to generate a multiplication signal, In the mass metering installation which has a subtraction means to subtract the above-mentioned multiplication signal from the 1st electrical signal of the above, and to generate a subtraction signal, and an output means to compute the mass of the above-mentioned measured object based on the above-mentioned subtraction signal, and to generate a mass signal The 1st rocking mass which determines the proper angular frequency of an above-mentioned load conversion means for measuring to rock where the weight of the above-mentioned measured object is received is computed based on the mass signal of the above-mentioned measured object which the above-mentioned output means generated. Compute the ratio of the rocking mass of the above 1st to the 2nd known rocking mass which determines the proper angular frequency of an above-mentioned load conversion means for amendment to rock, and a multiplier is computed based on this ratio. The above-mentioned multiplier multiplication means is characterized by establishing a multiplier correction means to correct the above-mentioned predetermined multiplier which carries out multiplication to the this computed multiplier.

[0014]

[Function] According to the mass metering installation concerning the 1st and 2nd invention, a load conversion means for measuring by which rocking from a body and the weight of a measured object were received generates the 1st electrical signal, and a load conversion means for amendment by which rocking from a body and the weight of the goods for amendment were received generates the 2nd electrical signal. And a multiplier multiplication means carries out the multiplication of the predetermined multiplier to the 2nd electrical signal, a multiplication signal is generated, a subtraction means subtracts this multiplication signal from the 1st electrical signal,

a subtraction signal is generated, and an output means computes the mass of a measured object based on this subtraction signal, and generates a mass signal. Moreover, the ratio of the rocking mass (m1) of the above 1st to the 2nd known rocking mass (m2) is computed by a multiplier correction means computing the 1st rocking mass (m1) based on the mass signal of the measured object which the output means generated, a multiplier is computed based on this ratio, and a multiplier multiplication means corrects the predetermined multiplier which carries out multiplication to this computed multiplier. Therefore, since sequential generation is calculated and carried out based on this corrected multiplier, the mass signal which an output means outputs can output a mass signal with a high precision.

[0015] According to the batching-by-weight equipment concerning the 3rd invention, the predetermined multiplier in which a multiplier multiplication means carries out multiplication like the 1st and the mass metering installation of the 2nd invention is corrected to the multiplier which the multiplier correction means computed and was obtained, and the weight of a measured object is measured based on this corrected multiplier. Therefore, a weight signal with a high precision can be outputted. According to the mass metering installation of the 4th invention, in the 1st and the mass metering installation of the 2nd invention, the 2nd electrical signal which the load conversion means for amendment generates corresponds with the self-weight of the load conversion means for amendment. Therefore, the 2nd rocking mass corresponds with the rocking mass of the load conversion means for amendment.

[0016]

[Example] One example of this invention is explained with reference to drawing 1 thru/or drawing 3 . The mass metering installation of this example shall be installed by the floor of the body 29 which is shown in drawing 1 and to rock, for example, the plant which is vibrating, or the vessel, and the floor of this plant shall be rocked up and down on the frequency of 5Hz (for 0.2-10Hz). For 38 shown in this drawing 1 , as for the load cell for dummies, and 34, the load cell for measuring and 39 are [a multiplier multiplication means and 35] subtraction means, 36 is an output means and 37 is a multiplier correction means. As shown in drawing 1 , the left end section is fixed to the rocking body 29, the installation base 41 for lay the measured object 40 is attached in the other end, and the load cell 38 for measuring (load conversion means for measuring) is constituted so that the 1st electrical signal corresponding to the weight of the measured object 40 may be generated in the condition that the strain gage 42 and ... which were stuck on the front face of this load cell 38 for measuring receive rocking.

[0017] The load cell 39 for dummies (load conversion means for amendment) As it is for detecting rocking of a body 29 and is shown in drawing 1 , it is fixed to the rocking body 29 so that the left end section may receive external rocking like the load cell 38 for measuring. In the other end, it is the known weight W2. It is the known weight W2 of weight 43 in the condition that the strain gage 44 which attached weight (goods for amendment) 43, used as the free end, and was stuck on the front face of this load cell 39 for dummies receives rocking. It constitutes so that the 2nd corresponding electrical signal may be generated.

[0018] After the 1st and 2nd electrical signals from each [these] load cells 38 and 39 are amplified by amplifiers 45 and 46, respectively, they are changed into a digital signal by analog-digital converters 47 and 48, and sequential storage is carried out at memory (storage means) 30 and 31 through the digital filters 49 and 50 which intercept each frequency component which subsequently ****** each digital signal and originates in vibration of the broader-based noise 38 and 39, i.e., load cells, and the installation base 41. And each electrical signal memorized by these memory 30 and 31 is inputted into the zero-point amendment means 32 and 33.

[0019] The zero-point amendment means 32 is the tare weight (sum total weight of installation base 41 and load cell 38 self) WA outputted as an initial load from A/D converter 45 to the 1st electrical signal which the load cell 38 for measuring outputs. A corresponding digital signal is amended to zero level.

[0020] The zero-point amendment means 33 is the weight W2 of the weight 43 outputted as an initial load from A/D converter 46 to the 2nd electrical signal which the load cell 39 for dummies outputs. Weight WB of load cell 39 self for dummies (tare weight) The digital signal equivalent to sum total weight (W2+WB) is amended to zero level.

[0021] The multiplier multiplication means 34 is multiplier K=K1 xK2 is constituted so that multiplication may be carried out to an output signal from the zero-point amendment means 33 and it may output to the subtraction means 35. this multiplier K1 The ratio E1 of the sensitivity of the load cell 38 for measuring, and the load cell 39 for dummies, i.e., the output per unit weight, and E2 a ratio -- K1 =E1 / E2 it is -- this E1 and E2 It is set up beforehand. Multiplier K2 Sum total mass MA of installation base 41 and load cell 38 self concerning the load cell 38 for measuring Mass M1 of a measured object Sum total mass (MA+M1), mass MB of load cell 39 self concerning the load cell 39 for dummies Mass M2 of weight 43 a ratio with sum total mass (MB+M2) -- it is K2 =(MA+M1)/(MB+M2). Thereby, it is the sensitivity E1 of the load cell 38 for measuring, and the load cell 39 for dummies. E2 The amplitude of the oscillating component from the load cell 39 for dummies resulting from a difference and the difference between the total weight (W2+WB) concerning the load cell 39 for dummies and the total weight (W1+WA) concerning the load cell 38 for measuring will be amended. mass MA and MB and M2 The known weight WA, WB, and W2 from -- the calculated value -- it is -- M1 since it is the mass value outputted from a subtraction means 35 to mention later -- K2 It is computable. [in addition,] And M1 Initial value inputs beforehand the central value (for example, central value) of the measured object 40.
[0022] and -- this (MA+M1) -- the proper angular frequency 1/2 of the load conversion means for measuring indicated by the claim (k1 / m1) 1st rocking mass m1 it is -- this k1 It is the spring constant of the load conversion means for measuring. and the proper angular frequency 1/2 of a load conversion means for amendment by which the above (MB+M2) is indicated by the claim (k2 / m2) 2nd known rocking mass m2 it is -- this k2 It is the spring constant of the load conversion means for amendment.
[0023] The subtraction means 35 receives the weight of the measured object from the zero-point amendment means 32, the measuring data containing an oscillating component, and the data of the oscillating component from the multiplier multiplication means 34, subtracts these two in digital one, and outputs difference. By this, the measuring data containing an oscillating component will be offset with the data from the multiplier multiplication means 34 only in the oscillating component, and will be changed into the data which were in agreement with the weight of a measured object.
[0024] The sensibility division means (output means) 36 is the sensitivity E1 of the load cell 38 for measuring about the weight data of the measured object 40 outputted from the subtraction means 35. A division is done by multiplication value E1 g of gravitational acceleration g, and it is the mass M1 of the measured object 40. It is the configuration to output. although not shown in drawing -- this outputted mass M1 It is displayed by the display.
[0025] The multiplier correction means 37 is the mass M1 of the measured object 40 which is the output signal of the sensibility division means 36. Tare mass MA of the load cell 38 for measuring Ratio K2 of the sum total mass (M1+MA) to the total mass (M2+MB) which computes sum total mass (M1+MA), and is applied to the load cell 39 for dummies It computes. Next, it is the configuration of correcting the multiplier K in which computes the new multiplier K of K1 and K2 =K, and the above-mentioned multiplier multiplication means 34 carries out multiplication to this newly computed multiplier K. that is, mass M1 which according to this multiplier correction means 37 actually measured the measured object 40 and was obtained using it -- a ratio, since K2 =(MA+M1)/(MB+M2) is computed Representation weight WD contained in the conventional batching-by-weight equipment shown in drawing 4 Actual mass M1 of a measured object The batching error based on a difference is cancelable.
[0026] Next, it is the mass M1 of the measured object 40 by the mass metering installation concerning this example. The theory for computing is explained using a formula. first, when the resonant frequency (for example, thing between 50-100Hz) of the load cell 38 for measuring and the load cell 39 for dummies and the vibration frequency (for example, thing between 0.2-10Hz) of rocking transmitted from a body 29 are extremely separated Output signal e1 of the load cell 38 for measuring Output signal e2 of (j) and the load cell 39 for dummies (j) e1 (j) =E1 .... (g+a (M1+MA) (j)) (1)
(j= 1, 2, ... N)

e2 (j) =E2 .... (g+a (M2+M[illegible])) (2)
(j= 1, 2, ... N)
It can express by carrying out. However, e1 (j) and e2 It is the maximum measurement size (the maximum integer of TK/T) (j) is decided by the sampled value in j sample time of the output signal of the load cell 38 for measuring, and the load cell 39 for dummies, and it is decided by the measuring time amount TK and sampling time T that N will be. Moreover, E1 and E2 The sensibility of each load cells 38 and 39, and M1 The mass of a measured object, and MA The tare mass of the load cell 38 for measuring, and M2 The mass of weight 6, and MB It is the rocking acceleration from the floor where the mass of the load cell 39 for dummies and g get across to gravitational acceleration, and a (j) gets across to the object for measuring, and the load cells 38 and 39 for dummies.

[0027]
It is here and is K1 =E1 / E2.... (3)
K2 (j) =(MA+M1)/(j−1) (MB+M2) .. (4)
It is since it is carrying out. M1 (j) =[e1 (j)−E1 MA g−K1 K2 (j) (e2 (j)−E2 g (MB+M2))] / E1 g .... (5)
(j= 1, 2, ... N)
By being able to obtain a ** type and calculating this formula (5), it is based on the measuring result M1 (j−1) of a device under test 40, and is a multiplier K2. It is the mass M1 of a device under test 40, correcting (j). It can ask for (j) serially.

[0028] Next, the measuring procedure of the above-mentioned mass metering installation is explained with reference to the flow chart shown in drawing 2 . First, an operator operates the keyboard (not shown) of a setting display means, and it is the initial value M1 of the tare mass MA of the load cell 38 for measuring, and the mass of the measured object 40. The value of the mass MB of (0) and the load cell 39 for dummies, the mass M2 of weight 43, the sensitivity E1 of the load cell 38 for measuring, the sensitivity E2 of the load cell 39 for dummies, gravitational acceleration g, and maximum measurement size N is inputted (S100). However, initial value M1 What is necessary is just to set up sorting criteria mass about (0), when this mass metering installation is applied to the grading-by-weight machine, for example. Next, when a predetermined measuring start key is operated, the operation means (not shown) of this equipment is E1/E2 =K1. It computes (S102) and measurement size j is set to 1 (S104). And it is a multiplier K2 by substituting for a formula (4) the mass data M1 (j−1) of the measured object 40 to which the multiplier correction means 37 was outputted by the sensibility division means 36, and calculating them. It is this computed multiplier K2 about the multiplier K2 (j−1) which computed (j) and was obtained last time. It corrects to (j) (S106). In addition, in a first-time operation, it is initial value M1. (0) is used and it is K2. (1) is computed.

[0029] On the other hand, memory 30 and 31 carries out the sequential storage of the measuring data SK and SD from the load cell 38 for measuring, and the load cell 39 for dummies, and it is e1. (j) and e2 (j) is obtained (S108). And the zero-point amendment means 33 is this e2. The weight 43 outputted as an initial load of the load cell 39 for dummies and the digital data equivalent to sum total weight E2 g (MB+M2) of load cell 39 self are subtracted from the digital data of (j), and it is e2. The digital data of (j) is amended to zero level, and the digital data A of only an oscillating component is obtained by this (S110). And the multiplier multiplication means 34 is a multiplier K1 to the digital data A of only this oscillating component. K2 It multiplies by (j) and B is outputted (S112).

[0030] Moreover, the zero-point amendment means 32 is e1. The digital data equivalent to tare-weight E1 MA g outputted as an initial load of the load cell 38 for measuring is subtracted from the digital data of (j), and it is e1. The digital data of (j) is amended to zero level, and the digital data C of the measured object 40 which contains an oscillating component by this is obtained (S114). And the subtraction means 35 subtracts B from C, and outputs the digital weight data D (S116), the sensibility division means 36 does the division of this digital weight data D by E1 g, and it is the digital mass data M1. (j) is computed and outputted (118 S 120). And it is the digital mass data M1 obtained by step 106 at return and step 120 when it judged whether the numeric value of measurement size j is below N (S122) and judged with the numeric value of

measurement size j bei[illegible]ow N. (j) is transposed to M1 (j−1), a [illegible]iplier K2 (j) is corrected, and sequential execution of each above-mentioned step is carried out. And it is the digital mass data M1 which ended measuring and were obtained in step 122 at this time when it judged with the numeric value of measurement size j being larger than N. (j) or two or more digital mass data M1 which were obtained by this time The mass of the measured object 40 is determined based on (j).

[0031] Next, the above-mentioned digital mass data M1 The result of the numerical simulation performed in order to check the validity of (j) is explained with reference to drawing 3 . The parameter used for simulation is as follows. MA =1kg, =(M2+MB)1kg, the actual mass of M= 0.5kg of a measured object, E1 =E2 =1 mV/kgf and g=9.8 m/s2 It carries out. The spring constant k1 of the load cell 38 for measuring, and the load cell 39 for dummies, k2 For the displacement xd(j) (unit of rocking of 36735 kgf/m and a body (floor) 29, mm) both. xd(j) =0.1xcos (2xpix5xjxT) .... (6)

(j= 1, 2, ..., 400)

It carries out. However, the frequency of 5Hz and T is T= 0.0005s in the sampling time. Moreover, the measuring time amount TK is [maximum measurement size N] 400 in 0.2s.

[0032] Drawing 3 (a) is drawing showing a as a result of simulation. Multiplier K2 of the formula (4) which the multiplier correction means 37 of this example calculates in this drawing 3 (a) In (j) =(MA+M1)/(j−1) (MB+M2) In multiplier K2 = (W1+WA/W2+WB) which the conventional metering installation indicated to be a simulation result at the time of setting the actual mass of M= 0.5kg of a measured object as the initial value M1 (0) of M1 (j−1) to drawing 4 calculates W1 The simulation result at the time of setting up weight W=0.5kgf with an actual measured object is shown. These two simulation results are completely the same, and can measure the mass (weight) of a measured object correctly.

[0033] Drawing 3 (b) is drawing showing b as a result of simulation. Multiplier K2 of the formula (4) which the multiplier correction means 37 of this example calculates in this drawing 3 (b) In (j) =(MA+M1)/(j−1) (MB+M2) The simulation result at the time of setting up 0.4kg which is different from the initial value M1 (0) of M1 (j−1) in the actual mass of M= 0.5kg of a measured object, It sets to multiplier K2 = (W1+WA/W2+WB) which the conventional metering installation shown in drawing 4 calculates, and is W1. The simulation result at the time of setting up representation weight 0.4kgf is shown. At the simulation result by the conventional example, it is a multiplier K2. To the batching error based on the difference with representation weight 0.4kgf and actual weight W=0.5kgf of the measured object 40 arising, in case it computes, by the simulation result by the example, after obtaining several times of measuring data, the mass of the measured object 40 can be measured correctly, and the conventional batching error can be canceled.

[0034] However, although considered as the configuration which measures the mass of the measured object 40 in the above-mentioned example, it can consider as the configuration which measures weight. It is got blocked, for example, sets at a ceremony (5). M1 (j) =[e1 (j)−E1 MA g−K1 K2 (j) (e2 (j)−E2 g (MB+M2))] / E1 g .... (5)

(j= 1, 2, ... N)

It calculates and is mass M1. Although it asked for (j), it is denominator E1 g of a formula (5) E1 It is the weight W1 of the measured object 40 by changing. It can consider as the configuration which measures (j). in addition, the flow chart of drawing 2 -- if it is -- after step 122 -- M1 (j) -- gravitational acceleration g -- multiplication -- carrying out -- M1 (j) g=W1 The step which outputs the weight signal of (j) is prepared.

[0035] And in the above-mentioned example, although weight 43 was formed in the load cell 39 for dummies, it can consider as the configuration which omitted weight 43. That is, it sets at a ceremony (5) and is the mass M2 of weight 43. It calculates as 0kg and the mass of the measured object 40 is measured. Under the present circumstances, each load cells 38 and 39 are manufactured so that each proper angular frequency of the load cell 38 for measuring and the load cell 39 for dummies may approach mutually if needed.

[0036]

[Effect of the Invention] According to the mass metering installation concerning the 1st and 2nd invention, based on the mass signal of the measured object which the output means generated, a

multiplier correction me[illegible]omputes the 1st rocking mass (m1). [illegible]the configuration of correcting the predetermined multiplier in which computes the ratio of the rocking mass (m1) of the above 1st to the 2nd known rocking mass (m2), computes a multiplier based on this ratio, and a multiplier multiplication means carries out multiplication to this multiplier computed and obtained. therefore, like the conventional equipment shown in drawing 4 W1 of multiplier K [=K1 and K2 =(E1 / E2) - (W1+WA/W2+WB)] Set-up representation weight WD Weight W1 of the measured object which it is going to measure The batching error produced according to a difference is completely cancelable. It is effective in the mass of goods being more correctly [than before] measurable with this.

[0037] in order [and] to ask for a multiplier K with the above-mentioned conventional batching-by-weight equipment -- representation weight WD since it is the configuration to set up -- weight W1 of a measured object Representation weight WD from -- it separates -- it is alike, and it follows and a batching error becomes large. Therefore, if it is going to make a batching error small, width of face of the measuring range cannot be taken widely, but in the 1st and 2nd invention, since it is the configuration which computes a multiplier K based on the mass signal of the measured object which the output means generated, it is effective in the mass of a measured object being correctly measurable in the measuring range larger than before.

[0038] According to the batching-by-weight equipment concerning the 3rd invention, the predetermined multiplier in which a multiplier multiplication means carries out multiplication like the 1st and the mass metering installation of the 2nd invention is corrected to the multiplier which the multiplier correction means computed and was obtained. Since it is the configuration which measures the weight of a measured object based on this corrected multiplier The above-mentioned conventional batching error can be canceled, and it is effective in the weight of goods being correctly measurable with this, and effective in moreover the weight of a measured object being correctly measurable in the measuring range larger than before.

[0039] According to the mass metering installation concerning the 4th invention, since the goods for amendment are not prepared in the load conversion means for amendment, only the part is effective in the ability to make weight of equipment lightweight, and it is effective in the cost of equipment being mitigable.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the electrical circuit of the mass metering installation concerning one example of this invention.
[Drawing 2] It is the flow chart which shows the operations sequence of the mass metering installation of this example.
[Drawing 3] It is drawing showing this example and the simulation result by the conventional metering installation.
[Drawing 4] It is the block diagram showing the electrical circuit of conventional batching-by-weight equipment.
[Description of Notations]
34 Multiplier Multiplication Means
35 Subtraction Means
36 Sensibility Division Means
37 Multiplier Correction Means
38 Load Cell for Measuring
39 Load Cell for Dummies
40 Measured Object
43 Weight

[Translation done.]